03650.000604 PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
: Examiner: T. Havan
TODD NEWMAN)
: Group Art Unit: 2672
Application No.: 09/916,436)
:
Filed: July 30, 2001)
:
For: REDUCING METAMERISM)
IN COLOR MANAGEMENT : May 14, 2004
SYSTEMS)

Commissioner for Patents
P.O. Box 1450
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RESPONSE TO OFFICE ACTION

Sir:

This is a response to the Office Action dated February 18, 2004 (Paper No, 6). Claims 1 to 26 and 30 are in the application, of which Claims 1, 13, 16, 19 and 30 are independent. Reconsideration and further examination are respectfully requested.

The present invention is an outcome of the inventor's work on techniques for obtaining good metameric results even under a variety of different viewing conditions. To the inventor's knowledge, although the problems of undesired metameric shifts due to different viewing conditions have been recognized, no one prior to his work had proposed techniques for reducing these metameric shifts so as to obtain good metameric results even under different viewing conditions.

As background, "metamerism" describes the physiological response of the human visual system by which the same color appearance can result from different color stimuli. In a simple example, a green leaf and a printout of a green leaf both look green, even though the printout (using modern four-color separation printing) contains absolutely no green colors. Rather, the printout of the green leaf contains cyan and yellow colorants. These cyan and yellow colorants stimulate the human visual system in ways that are similar to that of the actual green leaf, such that due to metameric effects both appear green to a human viewer.

But of course, a printout of a green leaf is not actually green. This can be seen most dramatically when viewing the printout of the green leaf under a different viewing condition such as under a yellow light. When viewed under a yellow light, the leaf will still appear green, whereas the printout of the leaf will appear black or dark blue. Thus, metamerism is greatly affected by viewing conditions, and the prior art obtains good metameric results only under viewing conditions that are nearly identical to the viewing condition for which the destination colorants were designed.

Recognizing this deficiency in the art, the inventor focused his efforts on the reduction of metameric shifts so as to obtain good metamerism even when a destination image is viewed under multiple different viewing conditions. According to his invention, to convert a color value of a color in a perceptual color space into a color value in a device dependent color space:

(a) multiple inverse transforms are applied to the color value, with each different inverse transform corresponding to a different viewing

condition, thereby resulting in a corresponding plurality of different target color values for the respectively different viewing conditions; and

(b) a single color value is calculated in the device dependent color space that fits the plural target color values with acceptable error.

Thus, the invention specifically contemplates more than one inverse transform for a color value. Rather, multiple inverse transforms are applied, and the multiple inverse transforms correspond to multiple different viewing conditions. In addition, a single color value is calculated that fits the plural target colors with acceptable error, such as a weighted least squares fit. By virtue of these features, the single color value retains good metamerism with acceptable metameric shift even under different viewing conditions.

Claims 1 to 26 and 30 were rejected under 35 U.S.C. § 102(e) over U.S. Patent 6,542,634 (Ohga). The rejection is respectfully traversed. As explained more fully below, Ohga is not seen to apply multiple inverse transforms to a color value so as to obtain plural target color values, each transform corresponding to a different viewing condition, and Ohga is not seen to calculate a single color value in device dependent color space that fits the plural target color values with acceptable error.

Rather, Ohga is seen to describe a conventional technique for color conversion, such as that illustrated in Figure 14 of the subject application. As part of the conversion, Ohga applies an inverse transform to colors in a perceptual color space so as to transform the color from perceptual color space to target color space. The inverse transform is selected based on target viewing conditions. For this reason, it is true that

Ohga stores multiple inverse transforms, each corresponding to a different viewing condition. However, in Ohga, only a single one of these inverse transforms is selected, and it is selected based on target viewing conditions.

As a consequence, since Ohga only selects a single inverse transform, Ohga does not apply multiple inverse transforms to a color value so as to obtain plural target color values, with each transform corresponding to a different viewing condition respectively. Instead, Ohga selects a single one of multiple inverse transforms based on target viewing conditions, and obtains a single target color value by application of the selected inverse transform.

Moreover, since Ohga does not obtain plural target color values, it naturally follows that Ohga does not calculate a single color value in device dependent color space that fits the plural target color values with acceptable error.

The Office Action cites the following portions of Ohga in support of its contention that Ohga applies multiple inverse transforms to a color value so as to obtain plural target color values, with each transform corresponding to a different viewing condition: column 8, lines 31-67; column 9, lines 1-4; and column 16, lines 34 to 63. Applicant disagrees with this interpretation of Ohga. Columns 8 and 9, in conjunction with Ohga's Figures 4 and 5, describe reconstruction of an input profile 42 depending on a viewing condition 1, and generation of LUT 11 which corresponds to the viewing condition. However, as explained above, the viewing condition is a single viewing condition, and not multiple different viewing conditions as set out in the claims. Accordingly, the Ohga apparatus will provide good metamerism only under the viewing

condition for which LUT 11 was generated, and will exhibit undesired metameric shifts under other viewing conditions. In contrast, the invention provides good metamerism even under different viewing conditions, with acceptable metameric shifts.

This interpretation of Ohga is supported by lines 34-63 at Ohga's column 16, in conjunction with Figure 12, which describes a process nearly identical to that of Figure 14 of the subject application. Accordingly, column 16 does not support the position taken in the Office Action, but rather supports the position taken by Applicant herein.

The Office Action further relies on the following portions of Ohga in support of its position that Ohga shows calculation of a single color value in device dependent color space that fits plural target color values with acceptable error: column 19, line 48 to column 20, line 37; column 23, line 1 to column 25, line 65; and Figures 25 and 27. Applicant respectfully disagrees with this assessment. Columns 19 and 20 describe selection of data corresponding to a viewing condition which is closest to the target viewing condition. Ohga uses the selected data to obtain his transformed color. However, since the color is transformed based on a single viewing condition, it is susceptible to the adverse metameric shifts described above when viewed under different viewing conditions.

As for Ohga's columns 23 to 25, and Figures 25 and 26, those portions are seen to describe Ohga's user interface. However, the user interface does not form part of rejected Claim 1, and is therefore of no moment to this discussion. Moreover, inspection of the cited portions actually supports Applicant's position that Ohga obtains his transformed color value from a single color, and not by a calculation that fits plural target color values with acceptable error.

A rejection for anticipation under § 102 is a strict word-for-word identity test in which a single prior art reference must show, with word-for-word identity, every element of the invention, with all of those elements arranged exactly as in the claim. MPEP § 2131. "For a prior art to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference." *In re Bond*, 15 USPQ 2d 1566 (Fed. Cir. 1990) (quoting *Diversitech v. Century Steps*, 7 USPQ 2d 1315).

Here, it is clear that Ohga describes nothing more than conventional technology already known to Applicant as shown in Figure 14 of the subject application. Ohga is not seen to show features of Applicant's invention, such as application of multiple inverse transforms to a color value so as to obtain plural target color values, with each transform corresponding to a different viewing condition, and such as calculation of a single color value in device dependent color space that fits plural target color values with acceptable error. As such, the rejection under § 102(e) is erroneous and should be withdrawn.

Applicant's undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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